


**REMARKS**

Claims 1 - 9 are pending. By this Amendment, the specification, Abstract and claims 1 - 9 are amended. Prompt and favorable examination is respectfully requested.

Respectfully submitted,



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Attachments:

Substitute Abstract  
Marked-up Specification  
Clean Specification

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# WATERCRAFT PROVIDED WITH TWO FLOATING BODIES STACKED ON TOP OF EACH OTHER

[0001] This application is the U.S. National Stage of PCT/CH2004/000582, filed September 15, 2004, which claims priority from CH2003-01587/03, filed September 17, 2003, the disclosures of which are incorporated herein in their entireties by reference thereto.

## BACKGROUND

[0002] The invention relates to a watercraft ~~according to the preamble of the first claim.~~

[0003] There exists a watercraft (i.e., Watercraft, in particular, boats and yachts), that are is generally fabricated in a procedure by which such that a the lower section, called the hull, is composed of a hydrodynamically shaped section. and The hull is dimensioned having to have an appropriate wall height and wall thickness so as to resist strong wave action or grounding, and sometimes as well so as to allow as little water as possible to come over the deck.

~~\_\_\_\_\_~~ The upper section of the ~~boat~~ watercraft, called the deck, is ~~the a~~ closing component of the ~~hollow hull~~ hull and ~~contains the~~ includes infrastructure for the ~~hold~~ watercraft, including ~~and~~ living quarters ~~and~~, ~~the a~~ helmstand, and ~~an~~ appropriate sealing ~~measures seal~~ against the intrusion of water into the ~~hull~~ hull.

[0004] Located under the deck is ~~the a~~ drive motor ~~which that~~ is mounted directly on hull reinforcements. A propeller system is Cconnected directly to the hull ~~are the propeller system including and includes a~~ the propeller bracket, Z-drive, jet drive, or outboard motor, rudder, motor cooling elements, and exhaust pipes.

~~\_\_\_\_\_~~ The hull and deck are usually glued, riveted or screwed together at the level of ~~a the~~ sheer rail, with parts that join the hull and deck ~~the joined parts~~ being elegantly concealed by the sheer rails.

[0005] A known aspect of watercraft is the fact that vibrations and oscillations caused by ~~the~~ mechanical components and by wave action are transmitted to the entire watercraft shell, the latter acting as a giant resonance chamber. Simply placing the motor and transmission on rubber mounts ~~succeeds in partially reducing~~ vibrations and oscillations.

[0006] ~~Other a~~ Approaches to increasing passenger comfort in a watercraft are known, such as, for example, an external hull-section damping ~~device means~~ as provided in ~~US~~ U.S. Patent No. 3,270,701 or an internal hull-section damping ~~means device~~ as provided

in ~~US~~ U.S. Patent No. 5,465,678; ~~however.~~ However, these do not meet specified requirements ~~in~~ with regard to a reliable ~~a~~-damping function and leveling.

### SUMMARY

[0007] The ~~goal of the invention is to~~ thus provides, among other things, a reliable damping function and leveling ~~of in a watercraft of the species indicated in the introduction.~~  
~~This goal is achieved according to the invention by the features of the first claim.~~

[0008] According to an exemplary aspect of the invention, F a watercraft includes at least two floating bodies; a drive device that drives the at least two floating bodies; and a control device that controls at least the drive device, wherein the at least two floating bodies are stacked, the at least two floating bodies are connected by at least one connecting device, at least one damping device is located between the at least two floating bodies, and an intermediate space between the at least two floating bodies is sealed by a sealing device. ~~he core aspect of the invention is thus that the watercraft has at least two floating bodies stacked one on top of the other, that the two floating bodies are joined by at least one connecting means, that a damping means is located between the two floating bodies, and that the intermediate space between the two floating bodies is sealed by sealing means.~~

[0009] By dividing the watercraft into two floating bodies or hull sections, ~~that the~~ hull section (the lower floating body) ~~which that~~ has to bear the main hydrodynamic buoyancy function, load, and vibrations and oscillations generated by the machinery, as well as wave impacts, is isolated and is designed as an independent floating body ~~which that~~ accommodates the motor, transmission, control elements, attachment ~~means~~ device, etc. In addition, the second hull section (the upper floating body) is also designed as a separate floating body and performs secondary hydrodynamic functions, such as, for example, lateral routing of the water flow, as well as providing a living- and work-compatible space for the crew of the watercraft. ~~The~~ is second upper hull section is attached in a saddle-mountable fashion via movable attachment elements to the lower floating body ~~located under it~~, the two floating bodies having a damping ~~means~~ device between the two sections as well as a seal between the ~~two~~ sections to prevent water from impairing the damping function. Both bodies have a flexible coupling ~~means~~ device ~~which that~~ easily enables the power supply, electrical signals, steering ~~means~~ device, motor power ~~means~~ device, and reversing ~~means~~ device to be interconnected.

[0010] Having two independent floating bodies not only enhances vessel safety but also provides a simple and cost-effective way of limiting any vibrations and oscillations caused, for example, by the motor, transmission, and propeller to a defined space while as much as possible decoupling this space from the remaining space. In addition, other initiators of vibration and oscillations such as wave impacts and possible propeller cavitation impacts are also not transmitted to the entire watercraft.

[0011] Between the two sections, the two stacked floating bodies possess an elastic ~~means-device which that~~ acts as a damping medium. This can be a compressible medium such as, for example, a rubber element or fillable expanding body, or a shock absorber system similar to those known from the automotive field.

[0012] Damping can be controlled either passively or actively by an appropriate electronic system, where~~in~~<sup>by</sup> in the case of active damping, the optimum damping rate is computed and adjusted by sensors. Active damping also allows the damping travel distance to be controlled such that the upper floating body can be raised so as to receive less spray from the water, or lowered in order to present the smallest possible profile to the wind.

[0013] In addition, the vibration damping can be made more sophisticated by having two individual control systems,— a primary and a secondary system,— ~~specifically~~ such that the two control circuits communicate with each other so as to implement the best damping. The lower floating body control system primarily controls hydrodynamic motion, for example, via trimming and stabilizing flaps or side stabilizing fins, propeller drive angle adjustment, etc.

[0014] The upper floating body control system implements control, for example, through vertically acting hydraulic or pneumatic elements to ensure the most stable, horizontally oriented upper floating body.

[0015] In addition, a passive or active horizontal damping ~~means-device~~ can be used to filter impacts occurring on the lower floating body when entering waves, thereby further enhancing comfort in the upper section.

[0016] In addition, at least one movable and guided connecting element is present between the two body units so that the watercraft, comprising the lower floating body and the upper floating body, is held together, and so that they~~se~~ are moved neatly parallel to each other. ~~However, the connecting element it~~ can also include a more complex, for example, cardan-type suspension system.

[0017] A seal of the intermediate space between the lower floating body and the upper floating body is required for the damping function to work properly. If water would collect in the intermediate space between the lower floating body and upper floating body, damping could no longer be ensured since the water is not compressible and must first be forced out to allow for a damping effect between the components. In response to a relief of damping, a vacuum might result, and water would be sucked into the intermediate space, thereby causing the watercraft to take on additional weight. For this reason, a circumferential, elastic and secure seal provided by an appropriate sealing device ~~and sealing means~~ is an essential component of a reliably functioning damping device.

[0018] A suitable bilge pump ensures that even in the event of minor damage to the seal, any intrusion of water would be automatically expelled from the intermediate space.

[0019] In addition, a relieving line allows the volume differential in the intermediate space to be compensated during the damping process.

[0020] Additional advantageous embodiments of the invention are presented in the subordinate claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The following discussion explains embodiments of the invention in more detail based on the drawings. Identical elements in the various figures are provided with identical reference numbers.

\_\_\_\_\_ [0022] Fig. 1 is a side view of a watercraft ~~which~~ that has a lower floating body separated from an upper floating body;

\_\_\_\_\_ [0023] Fig. 2 is a side view of a watercraft ready for operation ~~which~~ that has the lower floating body connected to the upper floating body;

[0024] Fig. 3 shows a horizontally acting damping ~~device~~ means;

\_\_\_\_\_ [0025] Fig. 4 is a rear view of a seal relevant for damping located between the lower floating body and the upper floating body;

\_\_\_\_\_ [0026] Fig. 5 is a front view of the seal relevant for damping located between the lower floating body and the upper floating body; and

[0027] Fig. 6 is a sectional view of the seal relevant for damping.

\_\_\_\_\_ ~~Only those elements essential to a direct understanding of the invention are shown.~~

#### DETAILED DESCRIPTION OF EMBODIMENTS

[0028] Fig. 1 shows a watercraft comprising a lower floating body 1, an upper floating body 2, ~~a motor 3, a as well as drive means-unit~~ 3, 4, and ~~a steering/control means device~~ 6, in ~~the a~~ separated state. ~~Lower~~ The lower floating body 1 of the watercraft can be hydrodynamically optimized for a specified load and travel speed. The Upper floating body 2 is placed over the lower floating body 1 and can have any appropriate recesses to meet the space requirements for the motor 3, living space, working space, ~~a and holding device~~ 5, and ~~the the steering/control device helmstand~~ 6.

[0029] The ~~Lower~~ floating body 1 serves primarily as the main buoyancy body and preferably has an overall height ~~which that~~ approximately corresponds to ~~at~~ the level of the waterline when the watercraft is in the loaded state. In terms of construction engineering, ~~the~~ a situation may arise in which a drive motor, and possibly the fuel tank, project above ~~this the~~ waterline, with the result that these elements will need to be protected from possible contact with the water by an appropriately higher side wall.

[0030] Fig. 2 shows a watercraft ready for operation, wherein the lower floating body 1, ~~comprising that houses the~~ motor 3, the drive unit 4, and a fluid-fuel tank 9, is connected to the upper floating body 2 by guide elements 7, attachment points 8, and damping ~~means-devices~~ (a passive damping device 10 and an active damping device 10, 11, for example).

[0031] Also shown are the living space, working space, ~~and holding device~~ 5, and ~~the steering/control device as well as the helmstand~~ 6 ~~which that~~ can be connected by a coupling ~~means-device~~ 13 to the lower floating body 1 so that the steering/control and drive elements are able to interact with the steering/control device 6 ~~helmstand~~. In addition, a sealing ~~means-device~~ 12 (which is an example of another damping device) ~~are-is~~ shown ~~which seal that seals off an~~ intermediate space 14 from seawater and foreign bodies, the intermediate space 14 having an air exchanging ~~means-device~~ 15 and a bilge pump 16

[0032] ~~Attachment~~ The attachment of the lower floating body 1 to the upper floating body 2 is effected through the damping ~~means-devices~~ 10, 11 so that motor vibrations and oscillations, in addition to wave impacts, drive-unit vibrations, or propeller vibrations, — are isolated from the upper floating body 2. The ~~D~~ damping can be effected either by a passive damping means-device 10, such as an elastically compressible ~~means-device~~ or inflatable tubes, or by an active pneumatic or hydraulic damping ~~means-device~~ 11 ~~which that~~ can additionally be controlled by an electronic system.

[0033] In addition, the active filling of the active damping means-device 11 enables the upper floating body 2 to be set higher or lower as required, while also allowing the damping travel to be increased or decreased independently.

[0034] The flexible coupling device 13 connects all technical ~~means-devices~~ related to making the watercraft operationally ready, the majority of which leads to the steering/control device helmstand-6, such as electric lines for the motor instrument displays, control lines for the trimming and stabilizing flaps, side thrusters, additionally separate power for the galley, cabin illumination, external markers of the watercraft, etc., as well as the mechanical connections such as, for example, transmission reversal, motor power and rudder function control. The steering/control device 6Helmstand-6 advantageously includes the steering, power lever, transmission, displays, and actuators for the technical ~~means-devices~~ such as the trimming and stabilizing flaps, propeller adjustment, and the side thruster. The control commands and other functions indicated above may, if required, also be transmitted wirelessly, by radio, for example, between the two floating bodies.

[0035] In addition to the vertical damping ~~means-device~~, a horizontal damping ~~means-device~~ is provided ~~which-that~~ enables an additional impact delay in response to entrance into waves. Fig. 3 shows a horizontally fixed passive damping device 10 and active damping device 11 ~~damping means-10, 11 which is that are~~ attached on one end to the lower floating body 1 by an attachment point 8, and on the other end to upper floating body 2 similarly by another attachment point 8.

[0036] Figs. 4 and 5 illustrate the central sealing ~~element-device~~ 12 for the damping function between the lower floating body 1 and the upper floating body 2. In order to prevent the admission of both water, —since this medium is incompressible and would therefore impair the damping function, — and foreign bodies, such as mud, and seal creatures, into an intermediate space 14 between the lower floating body 1 and the upper floating body 2, the a sealing ~~element-device~~ 12, for example, includes a circumferential band that has been applied. The s-Sealing element-device 12 can be designed so that it is able also to participate in the process given active leveling, for example, when large height differences are set between the lower floating body 1 and the upper floating body 2.

[0037] A relieving line ~~15~~ in the form of an air exchanging ~~means-device~~ 15 allows for an exchange of air between the intermediate space 14 and the outer environment (atmosphere), and can also be employed for the function of the bilge pump 16 in response to an unwanted admission of water.

[0038] Fig. 6 shows ~~the sealing device~~element 12 as well as and the connection of the two floating bodies 1, ~~and~~ 2 in detail. ~~The sSealing meansdevice-~~ 12 here is designed, for example, in tubular form and is thus able to compensate for movements made by the two floating bodies 1, 2 relative to each other. ~~This type of~~The -sealing means-device 12 can at the same time be employed as the passive damping means-device 10. The tubular sealing ~~means-device~~ 12 can be filled with air such that damping is able to be adjusted via the pressure, with the result that active damping can be generated even in the event of changes in the pressure during operation.

[0039] ~~The l~~Lower floating body 1 is connected to the upper floating body 2 by the connecting means-guide elements 7, attachment points 8, ~~aa~~ guide ~~means-device~~ 17 and a stop 18. The ability of the two floating bodies 1, 2 to move relative to each other is limited by ~~guide means-the~~ guide device 17 and the stop 18. An additional passive damping means device 10 can be advantageously located between the guide ~~means-device~~ 17 and the stop 18, thereby further damping the motion.

—————It is of course also possible to design the sealing element-device 12 as a skirt or in a different form.

[0040] It is of course understood that the invention is not limited to the embodiment shown and described.